



Review on garlic creeper-*Mansoa alliacea* (Lam.) A.H. Gentry (Bignoniaceae)

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Abstract

Mansoa alliacea (Lam.) A. H. Gentry belonging to the family *Bignoniaceae*, commonly called as 'Garlic vine' and or 'false garlic'. Is a native plant used by the Indigenous Indian tribes of the Amazon areas and has great ancestral value for the local communities and also part of the traditional medicine due to the presence of several constituents with important pharmacological properties. In folk medicine treatments *M. alliacea* is widely used for many diseases like cold, as an aid to fertility, commonly added to baths to treat feverish conditions, flu, body aches, cramps, fatigue, mosquito and snake repellent, epilepsy, uterine disorders, etc. Plant consist of includes diallyl disulphide, diallyl trisulphide, alliin, allacin, propyl allyl, divinyl sulfide, diallyl sulfide, dimethyl sulfide, daucosterol, beta-sitosterol, fucosterol, stigmaterol, iridoides and isothiocyanates, naphthoquinones, alkaloids, saponins, flavones. *M. alliacea* pharmacological activities are antioxidant, antibacterial, antifungal, anti-inflammatory, larvicidal, anti-plasmodial, etc. This review article compiled the ethnobotanical and phytopharmacological properties of *M. alliacea*.

Keywords: *Mansoa alliacea* (Lam.) A.H. gentry, garlic creeper, traditional uses, phytochemical analysis, pharmacological activities

Introduction

Mansoa alliacea (Lam.) A. H. Gentry belonging to the family *Bignoniaceae* commonly called as 'Garlic vine' and or 'false garlic'. Is a native plant used by the Indigenous Indian tribes of the Amazon areas and has great ancestral value for the local communities and also part of the traditional medicine due to the presence of several constituents with important pharmacological properties [1]. Mainly occurs in dry and wet forests of Brazil and from Argentina to Southern Mexico [2]. Leaves have pungent garlic smell and flavor when it is crushed but it does not smell if the plant is left alone [3]. In the Amazon rainforest, local peoples are using *M.alliacea* leaves as a seasoning and spices. Fresh young and soft leaves and stems have been added into the preparation of salads, sandwiches, and other food items. Crushed or powdered fresh and dries leaves can be used for cooking as a garlic substitute [4]. This garlic creeper is very vigorous and extremely floriferous, blooms many times in a year. Flowers are characterized by a white center that fades to paler shades when it matures and has compact and rounded inflorescence. Popularly this plant is grown as an ornamental and indoor pot plant [5].

M. alliacea is widely used in folk medicine treatments for many ailments like cold, as an aid to fertility, commonly added to baths to treat feverish conditions, flu, body aches, cramps, fatigue, mosquito and snake repellent, epilepsy, uterine disorders, etc. Plant consist of diallyl disulphide, diallyl trisulphide, alliin, allacin, propyl allyl, divinyl sulfide, diallyl sulfide, dimethyl sulfide, daucosterol, beta-sitosterol, fucosterol, stigmaterol, iridoides and isothiocyanates, naphthoquinones, alkaloids, saponins, flavones. *M. alliacea* pharmacological activities are antioxidant, antibacterial, antifungal, anti-inflammatory,

larvicidal, anti-plasmodial, anticancer, hypocholesterolemic, etc. [1].

Taxonomical Classification

Kingdom: Plantae
Subkingdom: Viridiplantae
Super division: Embryophyta
Division: Tracheophyta
Class: Magnoliopsida
Superorder: Asteranae
Order: Lamiales
Family: Bignoniaceae
Genus: *Mansoa* DC
Species: *Mansoa alliacea* (Lam.) A.H.Gentry [6].

Synonym(s)

Adenocalymma alliaceum
Adenocalymma pachypus
Adenocalymma sagotii
Bignonia alliacea
Pachyptera alliacea
Pseudocalymma alliaceum
Pseudocalymma pachypus
Pseudocalymma sagotii [5].

Vernacular names

English: Garlic Vine, False garlic, Wild garlic
Hindi: Lahan Bel
Tamil: Vellullipachai
Malayalam: Veluthullichedhi
Kannada: Bellulli balli
Manipuri: Chanameli
Bengali: Lata parul [3, 7].

Habitat

M.alliacea is an evergreen semi-woody climber that can either be described as a shrub or a vine it produces numerous woody vines from the root that grows only 2-3 tall and form shrub like appearance. It is a popular ornamental plant in the gardens of tropics has pretty continuous flowers and compact habitat. It is mainly present in tropical rainforests [3]. They need solid ground which is moisture-retentive, humus-rich, and organic matter-rich soil. They are not present near to the water bodies because it is not resistant to floods. *M.alliacea* also present in shaded areas of low vegetation and small primary forests. It occurs in tropical areas with rainfall of 1800-3500mm per year at a temperature between 20-30°C [2].

Distribution

It is native plant to South America, exactly from the Amazonian basin, and has been recollected in Bolivia, Brazil, several Caribbean Islands, Columbia, Panama, French Guiana, Suriname, Peru, Guyana, and Cost Arica, Ecuador [1].

Botanical descriptions

M.alliacea is an evergreen climbing shrub with semi-woody branches that are used as growing supports for attaching to larger trees. The plant reaches 3m tall and its leaves are bright green, slightly coriaceous, opposite, apex mucronate, margin entire, surface glabrous, texture papery base symmetrical and tapering, venation reticulate, and have 15 cm long two ovate [1]. Leaves have pungent garlic smell and flavor when it is crushed but it does not smell if the plant is left alone [3]. Fruits are elongate capsules up to 25-35 cm long which contain transverse oblong seeds characterized by wings broad. Flowers are violet in colour and grow in terminal or axillary racemosa inflorescence. They have funnel form corolla up to 6-9cm long with campanulate calyx 5-8mm long [1]. Flowers are characterized by a white center that fades to paler shades when they mature. New shoot growth originates in apical meristems from between two mature leaves [8]. Throughout in a year flowering and fruiting are takes place. The stem is 7-8 cm in length and 10-20mm in diameter. The Surface is rough because of the small pits present on it. The shape is cylindrical, colour of the young stem is green and the old stem is light brownish. Usually starts growing in the rainy season [5].

Traditional uses

Infusion of dried Ariel parts *M.alliacea* has been used as a vermifuge to treat fever and rheumatic pains in Surinam [9]. They are used for repelling bats and insects by burning leaves. In magical rituals, leaf infusion is used for clean and purification purposes. Also in commercials uses with fresh and dried leaves, bark, stem, and roots as a perfume fixative, as an ingredient in perfumes, or as medicine to treat rheumatism and atherosclerosis conditions (with tincture of bark and roots). Application of crushed leaves on the arthritic area for relieving pain. Tea made of bark used for the treatment of epilepsy. Crushed leaves are used as a patch on the forehead for headaches or as reviving tonic. The Indigenous people used the plant in magic or mystical rituals to scare away the bad spirits. In Brazil, leaves infusions of *M. alliacea* have been used to treat ailments like cold, fever, as a condiment and analgesic for headaches. Stem and leaves decoctions are used as an external wash for

the conditions like pains and muscular fatigue in Guiana. Leaves are used for the preparation of teas, for constipation, nausea, and cough. The alcoholic maceration of the root barks and patch of the leaves are used in the ailments like rheumatism and arthritis. Aqueous macerated roots as tonic and infusion of the leaves for fever or cold. [2]. In Peru, dried leaves are used in conditions like cold, pneumonia, malaria, and as insecticidal [10]. In Surinam stem soaked water is used as a healthy drink for pregnant women [11]. In Venezuela whole plant is used for an emetic. In the Amazonian region, the leaf is used in the bath to relieve sudden shock or a nervous state which is caused by terror called *Manchiari*. Tapajos Indians used for body ache and flu. The Esa'eja Indian used against cold and the *Amuesha* used to increase fertility as an infusion or oral form [12].

Phytochemical analysis

Leaves contains essential oils are allyl methyl trisulfide, allyl propyl trisulfide, dithiacyclopentene, allyl propyl disulfide, allyl methyl trisulfide, allyl isobutyl sulfide, allyl isobutyl disulfide, diallyl mono sulfide, diallyl disulfide, diallyl sulfide, diallyl trisulfide, diallyl tetrasulfide, 3-vinyl-1, 2-dithi-4-en, allyl tri-sulfite, tetra sulfite, di-2-propenyl, trisulfide, di-2-propenyl, 1-octen-3-ol, allyl methyl disulfide, allyl methyl tetra sulfide, propenyl propyl trisulfide, 3-vinyl-1, 2-dithi-4-ene, 3-vinyl-1, 2-dithi-5-ene, tri thiacyclohexene, diisoamyl disulfide, 2-methyl-2-pentenal, nonanethiol, cis-dipropenyl disulfide, 3,4-dimethyl-2, 3-dihydrothiophen-2-one, methyl salicylate, trans-dipropenyl disulfide. Petroleum extract of leaves contains n-alkanes C25-C35, n-alkanols, 24-ethylcholest-7-ene-3 β -ol, fucosterol, 3 β -hydroxyurs-18-en-27-oic acid, 32-hydroxyhexatriacontan-4-one, 19-hydroxyhexatriacontan-18-one, 34-hydroxy-8-methyl heptatriacontan-5-one, pentatriacont-1-en-17-ol, β -sitosterol, and stigmaterol. Flowers shows the presence of essential oils are diallyl disulfide, diallyl tetrasulfide, diallyl trisulfide, and 1-octen-3-ol. Methanolic extract of flowers contains alliin, β -amyryn, apigenin, apigenin-7-glucoside, apigenin-7-glucuronide, scutellarein-7-glucuronide, apigenin-7-glucuronyl glucuronide, apigenin-7-O-methyl glucuronide, cyaniding-3-rutinoside, β -sitosterol, β -sitosteryl d-glucoside, luteolin, 7-O-methyl scutellarein, ursolic acid. Bark Methanolic extract contains 9-methoxy- α -lapachone, 4-hydroxy-9-methoxy- α -lapachone. Ethyl acetate extract of whole plant contains p-coumaric acid, ferulic acid and resveratrol [1, 12, and 13].

Pharmacological activities

Anti-inflammatory activity

Hydroalcoholic extract of *M.alliacea* leaves shows anti-inflammatory activity in albino rats by inhibiting the induced edema in a graded fashion. In the carrageenan-induced paw edema acute model, the standard anti-inflammatory drug (Indomethacin 10mg/kg P.O) as well as the test drug mansoa alliacea leaves (100&200mg/kg) exhibited a significant reduction ($p < 0.001$) in the volume of paw edema in rats as compared to control rats. The action is due to the release of inflammatory mediators like serotonin, histamine, prostaglandins, bradykinin, and TNF- α [14].

Anti-oxidant activity

Ethanollic extract of *M.alliacea* leaves shows anti-oxidant activity, is investigated by the methods like hydrogen

peroxide scavenging assay, reducing power assay, and phosphomolybdenum method. A Considerable amount of flavonoids and phenols reveals high anti-oxidant activity. Phenolic compounds are known as powerful chain-breaking antioxidants, important plant constituents because of their scavenging ability due to their hydroxyl group and contribute directly to anti-oxidative action [15].

Anti-cancer activity

Water extracts of *M.alliacea* at lower doses show anticancer activity on cancerous cell lines. Doses between 1.254-10.04mg/ml of extract applied to T3-HA cancer cells inhibited cell growth but higher doses like 29.92-89.6mg/ml destroyed the colonies of cancer cells. Application of extract to NIH Swiss mouse cell cultures resulted in the inhibition of growth at higher concentrations, but at a concentration of 10.14mg/ml, cell growth began to increase after three days. Cell death was less at a lower concentration than that of the T3-HA cancer cells, in lower concentrations inhibit the cell growth and non-cancer cells. Thus extract selectively targets T3-HA mouse cancer cells but not NIH Swiss embryonic mouse cell lines. *M.alliacea* phytoconstituents like allicin, allyl sulfide or diallyl sulfide shows tumor suppression effect [8].

Anthelmintic activity

Anthelmintic activity of *M.alliacea* against *Pheretima Posthuma* by using in-vitro and in-silico approaches. Studies reveal that the methanolic extract has the most important dose-dependent anthelmintic efficacy at various levels. By in-silico studies, it shows that the four phytochemicals like Apigenin 7-O-methyl glucuronide, scutellarin, luteolin, and ursolic acid of *M.alliacea* are likely against the β -tubulin were identified by using the PyRx tool. Utilizing the contemporary strategies, these phyto-compounds from a natural origin might establish a reliable medication or support lead identification [16].

Antifungal activity

M.alliacea leaf extract of 4.1% significantly ($p < 0.05$) inhibited the fungal growth, spore formation, spore germination, and fungal biomass of *Colletotrichum acutatum*, which causes anthracnose diseases. Minimum inhibitory concentration (MIC) value of *M.alliacea* was about 0.7% on fungi with inhibitory power of 5.25mm. Antifungal activity of *M.alliacea* due to the presence of high amount of phenol and alkaloids [17].

Hypocholesterolemic activity

Dried flower of *M.alliacea* shows hypocholesterolemic activity in rats were fed about 6 weeks with 2% level in diet. The flower causes the lowering of absorption of dietary cholesterol from intestine and also due to the presence of organosulphur compounds [18].

Larvicidal activity

The essential oils and hydrolat of *M.alliacea* shows larvicidal activity in aqueous, ethanol and methanol extracts. The extracts of 10% reduced in 6.15, 3.42 and 5.57 days, were inhibited the normal growth and development of mosquito larvae, prolonging and delaying the larval and pupal duration. Larvicidal activity is due to the presence of major constituents like diallyl disulfide and diallyl sulfide [19].

Antibacterial activity

n-hexane, chloroform, ethanol and aqueous leaves extract of *M.alliacea* shows the antibacterial activity against the strains of Gram-positive bacteria like *Bacillus subtilis* and *Staphylococcus aureus* and Gram negative bacteria like *Escherichia coli* and *Pseudomonas aeruginosa* at minimum inhibitory concentration (MIC) of 10-2.5mg/ml. *M.alliacea* leaves can be used as natural product to inhibit the growth of bacteria. Antibacterial activity is due to the presence of secondary metabolites such as anthraquinone, flavonoids, alkaloids, steroids, tannins and saponins [20].

Antinociceptive effect

Hydro-ethanolic extract of *M.alliacea* shows the antinociception effect in inflammatory pain model with arthritis through of the intraplantar injection of complete Freund's adjuvant (CFA) in mice. The *M.alliacea* extract did not lower the CFA-induced edema and myeloperoxidase activity and also non-selective and δ -selective opioid receptor antagonists with I_{max} of $98 \pm 2\%$ and $93 \pm 2\%$, respectively. Antinociceptive is due to the presents of phytoconstituents like ferulic and chlorogenic acids, luteolin, apigenin etc. and the activity is mediated by δ -opioid receptors.

Conclusion

Mansoa alliacea (Lam.) A.H.Gentry belonging to the family *Bignoniaceae*, commonly called as 'Garlic vine' and or 'false garlic'. This review gives information about the taxonomy, habit and habitat, morphological characters, chemical constituents, traditional uses, phytochemical and pharmacological properties of *M.alliacea*. The plant has immense medicinal values. In folk treatments the plant parts are widely used for cold, as an aid to fertility, commonly added to baths to treat feverish conditions, flu, body aches, cramps, fatigue, mosquito and snake repellent, epilepsy, uterine disorders, etc. Chemical composition of plant includes diallyl disulphide, diallyl trisulphide, alliin, allicin, propyl allyl, divinyl sulfide, diallyl sulfide, dimethyl sulfide, daucosterol etc. This review will act as an eye opener of potential of the *M. alliacea* and encourage on further research on the phytoconstituents and other unexplored medicinal values.

Conflict of Interest

Authors declare no conflict of interest.

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